REMARKS

In the Office Action dated July 27, 2005, claims 1-3 and 5-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bittl in view of Snyder. Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bittl in view of Snyder, further in view of Runnoe.

These rejections are respectfully traversed for the following reasons.

In the subject matter disclosed and claimed in the present application, a rotating anode in an x-ray tube has a hollow body that surrounds the axle on which the anode rotates, and the axle has a ring projection thereon disposed in the hollow interior of the anode. A gap exists between the outer surface of the ring projection and the inner surface of the interior of the anode, that is filled by a liquid metal, and the combination of the liquid metal and the gap are stated in claim 1 to form a liquid metal fluid bearing for the rotating anode, that allows rotation of the hollow body around the axle.

The Examiner has relied on the Bittl reference as disclosing a rotating anode having a projection disposed in a hollow interior of the rotating anode, and has relied on the Snyder reference as disclosing a similar arrangement wherein the gap between the projection and the interior surface of the hollow anode is filled with a liquid metal. The Examiner stated that this liquid metal in the gap forms a liquid metal fluid bearing, however, the Examiner has not provided any substantiation for this conclusion in the teachings of the Snyder reference, nor any other reference of record, and Applicant respectfully submits no such liquid metal bearing is formed, or could be formed, by the arrangement disclosed in the Snyder reference.

This is in part because, as is well known to those of ordinary skill in the field of liquid metal bearings, the gap in such a liquid metal bearing is extremely thin, such as in the micrometer range, and the amount of liquid metal in the gap is also very slight, being sufficient only to wet the surfaces to provide the necessary bearing action. Since the Applicant is entitled to write the specification assuming knowledge possessed by those of ordinary skill in the relevant technology, it was not necessary in the present disclosure to describe the specific, extremely slight dimensions of such a liquid metal bearing. Nevertheless, at page 3, line 9 of the specification as originally filed the liquid metal in the gap was referred to as a "liquid metal film," and claim 1 therefore has been amended to use this term to describe the liquid metal in the gap. The language already present in claim 1, however, stating that the liquid metal and the gap form a liquid metal bearing, already inherently includes the structural limitation of the gap being of the extremely narrow size, and the liquid metal therein being of an extremely small amount, so as to be able to achieve the liquid metal bearing, as claimed.

Evidentiary support for these known, inherent structural attributes of a liquid metal bearing is present in the prosecution record, in German OS 195 23 162, which was submitted as Reference AL in the Information Disclosure Statement filed July 29, 2004. That reference discloses a liquid metal bearing used in an x-ray tube, but at a different location and formed by different components than the subject matter disclosed and claimed in the present application. Nevertheless, the aforementioned structural attributes of such a liquid metal bearing are described in that reference, in the paragraph beginning at column 5, line 6. That paragraph refers to the layers 28-33 as having a minimum thickness of 100 nanometers, which is necessary in order

necessary in order to achieve a uniform aluminum oxide coating, and having a maximum thickness of 1,000 nanometers, which is necessary in order to allow the aluminum oxide to adhere to the molybdenum surface. As can be seen from Figure 3 of that reference, the gap between surfaces 13 and 16, which is filled with liquid metal to form the liquid metal bearing, has a thickness equal to the combined thicknesses of layers 30 and 31. Since each of those layers 30 and 31 has a thickness in a range between 100 nanometers and 1,000 nanometers, this means that the gap between the surfaces 13 and 16 will have a size in a range between twice of each of those values, i.e., the liquid metal bearing gap will have a size in a range between 200 nanometers and 2,000 nanometers which, as noted above, is in the millimeter range.

In both the Bittl and Snyder references relied upon by the Examiner, the gap between the projection extending from the axle, and the interior surface of the hollow anode, is for the purpose of accommodating a coolant which, in the Snyder reference, happens to be al liquid metal. There is no teaching in either of those references that the gap has, or even could have, the extremely small dimensions that are necessary in order to form a liquid metal bearing. Simply filling a gap with liquid metal, as in the Snyder reference, does not create a liquid metal bearing, and the Examiner has provided no technical substantiation for making such a conclusion.

Therefore, neither the Bittl reference nor the Snyder reference discloses or suggests a gap between the axle projection and the interior surface of the hollow anode that has dimensions sufficient to form a liquid metal bearing, and therefore despite the teaching in the Snyder reference to fill that gap with liquid metal, this still

does not provide a teaching to produce a liquid metal bearing at that location, by the combination of the gap and the liquid metal in the gap.

Claim 1, therefore, would not have been obvious to a person of ordinary skill in the field of designing an x-ray tube with a liquid metal bearing therein, based on the teachings of Bittl and Snyder under the provisions of 35 U.S.C. §103(a). Claims 2, 3 and 5-10 add further structure to the non-obvious combination of claim 1, and therefore would not have been obvious to such a person of ordinary skill for the same reasons discussed above in connection with claim 1.

With regard to the rejection of claim 4, the Runnoe reference is similar in its teachings to Bittl and Snyder. The Runnoe discloses an x-ray tube wherein the rotating anode is supported by magnetic bearing. Like the Snyder reference, however, the vacuum tube in the Runnoe reference contains liquid metal for heat dissipation. Like the Snyder reference, the Runnoe reference does not disclose or suggest a gap in which the liquid metal is disposed that has dimensions that are sufficient for creating a liquid metal bearing. Therefore, even if the combination of Bittl and Snyder were further modified in accordance with the teachings of Runnoe, the subject matter of claim 4, which embodies the subject matter of claim 1 therein, still would not result. Claim 4, therefore, would not have been obvious to a person of ordinary skill in the field of designing x-ray tubes with a liquid metal bearing, based on the teachings of Bittl, Snyder and Runnoe, under the provisions of 35 U.S.C. §103(a).

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

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